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Letter to the editor

Removing filling material during secondary root canal therapy: An update

Complete removal of filling material from the root canal system is essential for cleaning, reshaping, and obturation. However, the anatomical complexity of the tooth root makes it difficult to remove the filling material from the root canal. A non-surgical approach is the first choice of treatment after the failure of endodontic treatment. In this regard, endodontic rotary systems and the implementation of supplementary systems can optimize the success rate of removing filling material during secondary therapy. Considering the mentioned points, this brief letter focused on removing filling material during secondary root canal therapy using various endodontic treatment systems.[1–3]

In a review study based on 46 articles, the efficacy of various supplementary systems for removing the filling material during endodontic procedures was evaluated. The selected studies provided the following supplementary procedures: 1) XP-endo system, 2) ultrasonic inserts, 3) GentleWave system, 4) self-adjusting file, and 5) photon-induced photoacoustic streaming for mechanical debridement. The study reported that although complete removal of the filling material was not always achieved, the implementation of all various procedures in retreatment cases can effectively remove the filling material. Hence, supplementary procedures optimize the removal of filling material and should be considered during retreatment procedures.[4]

In line with a previous study, Santos-Junior et al. investigated the effect of supplementary systems after the retreatment procedure. This research included 24 distal mandibular molars prepared with Reciproc Blue R40 and filled using the hybrid technique. The retreatment procedure was also performed with R40, followed by final apical preparation with R50. After the retreatment procedure, the samples were divided into two groups (n = 12), and supplementary systems were performed as follows: Group 1) XP-endo Finisher R and Group 2) Flatsonic ultrasonic tip. The results showed that Group 2 was more effective in removing the filling material in the coronal and middle thirds ($P < 0.05$). There was no significant difference in the apical third between groups. Overall, it was concluded that applying supplementary systems can be considered an excellent option for removing the rest of filling material.[1]

In another study, Pinto et al. also evaluated supplementary systems in removing the filling material during retreatment. To this end, the mesial roots of extracted mandibular molars were selected and randomly divided into two groups (n = 12). The samples were prepared with HyFlex EDM 25/.08 and filled with two sealants (i.e., Bio-C Sealer and AH Plus) using single cone techniques. Afterwards, the samples were retreated with ProDesign Logic (PDL) RT files (i.e., 30/10 in the cervical, 25/.08 in the middle, and 20/.06 in the apical thirds). The final apical preparation was performed with PDL 35/.05. After retreatment, the supplementary systems were performed with PDL 50/.01 and XP-endo Finisher. Micro-CT evaluation showed a decrease in residual filling material in the apical third in both protocols. Since supplementary systems enable the removal of the filling material in the apical third without apical transport, they are recommended for the concerning processes.[5]

Cecagno et al. evaluated 3 reciprocating systems for the removal of filling material by opting for 39 extracted mandibular premolars. The samples were prepared with the ProTaper universal system up to the F3 file and filled with AH Plus sealer and F3 Gutta-percha. They were randomly divided into 3 groups (n = 13) and retreated as follows: Group 1) Reciproc 40/.06, Group 2) Reciproc Blue 40/.06, and Group 3) WaveOne Gold 35/.06. The results showed that all reciprocating systems were effective in removing filling material. The remaining filling material was observed in all groups ($P > 0.05$). As a result, using an appropriate reciprocating system can be helpful during retreatment procedures.[2]

Karunakar et al. evaluated the efficacy of 2 rotary systems and H-file in removing the filling material. For this purpose, 30 extracted single-root canals were selected. After access cavity preparation, each sample was prepared with a

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ProTaper universal system up to the F2 and filled with gutta-percha and AH Plus sealer using the lateral compaction technique. The samples were randomly divided into 3 groups (n = 10) and retreated as follows: Group 1) H-file with sizes of 35, 30, and 25 using crown-down technique, Group 2) Neo-endo retreatment system with N1 (30/.09) in the coronal third, middle third with N2 (25/.08), and apical third with N3 (20/.07), and Group 3) HyflexTM retreatment system with file size of 25/.09. After retreatment procedures, analysis of residual filling material showed that the Hyflex system left less filling material than the other groups ($P < 0.05$). It is therefore recommended to use the Hyflex system.[3]

In another study, Sairaman et al. evaluated the heat-treated retreatment files and another system for removing the filling material in vitro using nano-CT scanning. The samples used in this research included 40 freshly extracted single teeth. The samples were randomly divided into two groups (n = 20), and the retreatment procedures were performed as follows: Group 1) using Solite RS3 files, i.e., RS1 − 30/.08 non-heat treated in the coronal third, RS2 − 25/.07 heat-treated in the middle third, and RS3 − 20/.06 heat-treated in the apical third, and Group 2) using the ProTaper retreatment system, i.e., D1, D2, and D3. The result showed that although both systems were effective in removing filling material, Solite RS3 required less time to remove the filling material than another system. Using a novel heat-treated system can optimize removing the filling material and reduce the retreatment time.[6]

Monteiro et al. examined the efficacy of two systems, namely HyFlex and Reciproc, during retreatment procedures. A total of 28 single root teeth of mandibular cadavers were included in this study. The samples were prepared with Reciproc R40 and filled using lateral compaction. Afterwards, the samples were randomly divided into two groups (n = 14) and retreated as follows: Group 1) using HyFelx remover 3 mm shorter of working length (WL), followed by CM 40/.04 and 50/.04 at WL and Group 2) using Reciproc R50 until reaching WL. The results showed that the remaining filling material was 80.8 % and 65.9 % for the HyFlex and Reciproc systems, respectively ($P > 0.05$). The HyFlex system produced less than that of extrusion filling material ($P > 0.05$). Both protocols provided similar efficacy in removing filling material. An appropriate system should be selected based on the clinical situation.[7]

Regarding the information in this brief letter, using the following procedures should be considered during retreatment: 1) applying supplementary systems (i.e., XP-endo system, ultrasonic activation, self-adjusting file, and GentleWave system), 2) using ProDesign Logic RT files, 3) applying reciprocating systems, including Reciproc system and WaveOne Gold, 4) using retreatment systems including Neo-endo and Hyflex TM, and 5) using novel heat-treated system, i.e., Solite files. Consequently, clinicians' ability to accurately access filling materials and select the appropriate technique requires a multidisciplinary therapeutic approach that is indispensable for retreatment procedures.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

Acknowledgments

None.

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Karl-Thomas Wrbas
Center for Dental Medicine, Department of Operative Dentistry and Periodontology, Faculty of Medicine and Medical Center, University of Freiburg, Hugstetter Str. 55, 79106 Freiburg im Breisgau, Germany
Faculty of Medicine and Dentistry, Danube Private University, 3500 Krems, Austria

Kaveh Nasiri*
Independent Researcher, Essen, Germany

Maya Doychinova
Department of Conservative Dentistry and Oral Pathology, Faculty of Dental Medicine, Medical University of Varna, Bulgaria

*Corresponding author. Independent Researcher, Koenigraetzstrasse 13, Essen 45138, Germany.
E-mail address: DDS.Nasiri@web.de (K. Nasiri)

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